Syllabus: CHEM 2380 RBT-Synthesis Lab I (2 semester credits)

Summer 2026-Georgia Tech Lyon France Study Abroad Program

Instructor

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COURSE DESCRIPTION

CHEM 2380-Synthesis Laboratory I is an introductory undergraduate laboratory course focused on the practical application of organic chemistry principles. The course emphasizes experimental techniques, including synthesis, purification, and characterization of organic compounds, as well as data analysis and scientific communication.

The purpose of the course is to develop students' proficiency in experimental design, laboratory safety, and technical problem-solving within an organic chemistry context. The course also aims to strengthen students' ability to interpret experimental results, maintain accurate laboratory records, and communicate findings effectively through written reports.

The course is essential for students pursuing careers or further study in chemistry, biochemistry, chemical engineering, biology, biomedical engineering, medicine, and

related fields. It provides critical laboratory skills and analytical thinking abilities that are foundational for research, industry applications, and graduate or professional programs.

COURSE LEARNING OUTCOMES

Students in the course will be able to:

- Apply organic chemistry techniques to perform the synthesis, isolation, purification, identification, and characterization of organic compounds, including methods such as chromatography, spectroscopy, and air-sensitive handling.
- Explain underlying theoretical principles of experimental techniques, including reaction mechanisms and the scientific basis of instrumental methods.
- Analyze and interpret experimental data to accurately identify organic compounds and evaluate the success of laboratory procedures.
- Communicate scientific findings effectively through clear, well-organized laboratory reports, post-lab assignments, and proper documentation in detailed, reproducible laboratory notebooks.
- Demonstrate professional laboratory competency, including adherence to safety protocols, proper handling and disposal of chemicals and equipment, and mastery of course knowledge through lab-practicum and comprehensive final exam assessments.

TEXTBOOKS/SUPPLIES

Be sure to get these materials prior to departure for the study abroad program:

- Laboratory Coat, 100% cotton, must cover to the knees. (Waist-length, plastic, or other disposable coats are not acceptable.)
- Safety Glasses with splash guards. Safety goggles are also appropriate but may make your forehead sweat. Note: Contacts lens cannot be worn while in the lab. You will need to wear glasses (with safety glasses over them or safety goggles over them).
- A bound composition notebook. This will serve as your lab notebook.
- Students are also asked to use Genius Scan app (to convert assignments to a single pdf file)

The course will refer to topics covered in "Organic Chemistry" by David Klein for discussion of the theory (structure, reactivity, mechanism).

SCHEDULE

The course will include lab periods (equivalent to 48 lab contact hours), ten 60-minute lectures, a lab practicum, and a final exam. **Since this course is offered as part of a study abroad program, dropping the course is not permitted without permission of the program director. In addition, Institute policies regarding Final Instructional Class Days and Reading Periods are not applicable.**

GRADES

Note: X/Y means "X out of Y"

TO EARN AN A:

- Attend and participate in 9/10 lectures
- Pass 6/7 prelab notebook preparations
- Pass 5/6 post-lab data sheets and questions
- Pass 6/7 safety activity/ reflections
- Pass 12/14 of knowledge check quizzes
- Earn a total score of 90 points or higher on the lab practicum (out of 30 points) and final exam (out of 70 points)

TO EARN AN B:

- Attend and participate in 8/10 lectures
- Pass 5/7 prelab notebook preparations
- Pass 4/6 post-lab data sheets and questions
- Pass 5/7 safety activity/ reflections
- Pass 11/14 of knowledge check quizzes
- Earn a total score of 80 points or higher on the lab practicum (out of 30 points) and final exam (out of 70 points)

TO EARN AN C:

- Attend and participate in 7/10 lectures
- Pass 4/7 prelab notebook preparations
- Pass 3/6 post-lab data sheets and questions
- Pass 4/7 safety activity/ reflections
- Pass 10/14 of knowledge check quizzes
- Earn a total score of 70 points or higher on the lab practicum (out of 30 points) and final exam (out of 70 points)

TO EARN AN D:

- Attend and participate in 6/10 lectures
- Pass 3/7 prelab notebook preparations
- Pass 2/6 post-lab data sheets and questions
- Pass 3/7 safety activity/ reflections
- Pass 9/14 of knowledge check quizzes
- Earn a total score of 60 points or higher on the lab practicum (out of 30 points) and final exam (out of 70 points)

If the requirement of a D is not met, the grade is an F.

Lab Experiments include:

Experiment 1: Synthesis of *tert*-amyl chloride

Experiment 2: Synthesis of dicinnimalacetone (DCA)

Experiment 3: Bromination of Anisole

Experiment 4: Salen synthesis

Experiment 5:Asymmetric synthesis & Thin-layer chromatography

Experiment 6: Flash Chromatography of Expt 5 Product; Recrystallization/Mp of Expt 4 Product

Experiment 7: Synthesis of a Grignard Reagent and Reactivity

LECTURE ATTENDANCE AND PARTICIPATION

Lectures will focus on problems/concepts associated with the pre-lecture materials posted in canvas as well as preparation for upcoming experiments.

LAB ATTENDANCE

You must be present for and complete all experiments to be eligible to earn a passing grade in the course. If you are absent for any reason, please contact Dr. Tyson **as soon as possible**. Make-up labs are not possible due to staffing constraints as well as the accelerated pace of the course. **Students who are more than 10 minutes late to the start of lab will not be allowed to continue with the lab.**

PRE-LAB NOTEBOOK PREPARATION

Students must read the lab manual and prepare their lab notebook prior to each lab (experiment) to be conducted. The pre-lab notebook preparation (i.e. see pre-lab notebook rubric) must be completed by 11:59pm on the evening before the lab and uploaded to canvas as a single pdf file. Students are advised to use the genius scan app to convert their notebook pages to a compiled pdf. The purpose of this exercise is to make sure that you are prepared to begin the experiment. **You will be referring to your lab notebook for procedures and collecting data during the lab. The lab manual may only be referenced (if needed) during the lab.** A checkmark indicates that you have satisfactorily completed the pre-lab note preparation assignment.

POST-LAB DATA SHEETS AND REFLECTION QUESTIONS

Students are expected to submit post-lab data sheets and answers to questions related to each experiment. A checkmark indicates that you have satisfactorily completed the pre-lab note preparation assignment.

LAB SAFETY AND REFLECTION

Following each lab, students will complete a safety reflection on their lab activity. The purpose of this exercise is to train one on safe practices, proper chemical chemical

handling/techniques, proper disposal of waste, and create of culture of safety. **IMPORTANT: <u>ALWAYS</u> *wear lab glasses and lab coat when in the lab.*** *A checkmark indicates that you have satisfactorily completed the pre-lab note preparation assignment.*

KNOWLEDGE CHECK QUIZZES

Knowledge check quizzes consist of two multiple choice questions. These quizzes assess whether you have mastered the concepts covered in the module. You may attempt each knowledge check question up to two times. A score of "2" indicates that you have passed the knowledge check (i.e., answered both questions correctly). A score of 1 or 0 indicates that you have not passed the knowledge check. **Note: There is an opportunity to replace a score of 1 or 0 on the final exam if you successfully complete the corresponding final knowledge check section (associated with the 1 or 0) .**

LAB PRACTICUM AND FINAL EXAM

The lab practicum will involve solubility analysis, recrystallization, and determination of melting points similar to Labs 2 (DCA) and 4 (Salen). The lab practicum will be graded on a maximum scale of 30 points

The final exam will consist of 14 final knowledge check sections (i.e., 2-3 multiple choice questions per knowledge check section) and 3-5 short answer questions. Students will complete a paper-based final exam covering topics introduced in the lab. The final exam will be graded on a maximum scale of 70 points.

ACADEMIC INTEGRITY

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

STUDENTS WITH LEARNING NEEDS AND SPECIAL ACCOMMODATIONS

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain a letter of accommodation. Please also email me as soon as possible to set up a time to discuss your learning needs.

STUDENT-FACULTY EXPECTATIONS AGREEMENT

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

ACADEMIC SUPPORT WHILE ABROAD

Given the typically small class sizes associated with study abroad programs, students are encouraged to seek academic assistance from their instructors or teaching assistants during scheduled office hours or by arranging individual appointments, as needed. In addition, students may access free tutoring services through Georgia Tech Knack (see success.gatech.edu/tutoring for more information). Students are also expected to notify the instructor and/or program director promptly if circumstances arise that may adversely affect their academic performance.